DEVELOPING A MULTIMEDIA REMEDIAL TRACKING PACKAGE FOR DYSGRAPHIA AMONG PRIMARY SCHOOL STUDENTS WITH SPECIFIC LEARNING DISABILITIES

Today, the educational scenario in India is meretricious. We speak of education for all: but in reality a majority of the students remain academically backward. Their number is alarmingly high at all stages of education. Education is thus the monopoly of a handful of able students and the low performing students labeled as the ‘learning disadvantage’ becomes ossified.

When the child enters the world, he is unaware of its complexities. His mind is a clean slate and gradually with increase in interaction with environment he keeps assimilating and accommodating concepts and thereby adjusts to his surroundings. During the process of interaction and adjustment he is able to learn certain things and faces problems in learning certain others. Thus the child seems to be in a disabled or difficult situation in the learning of different things essential for his development.

Children are expected to be high scorers in school: when they fail, parents get frustrated. In every class, at least 20% of children get poor marks and they are considered as scholastically backward. About 10% of young children suffer from learning disability. Poor marks in examinations indicate that the children suffer from learning problem but they are labeled as underachievers. These children may have normal or above IQ. The discrepancy between their high intelligence and poor academic performance is the nucleus of the matter in learning disability.

In a definition given by Kirk in 1962, "A Learning Disability (LD) refers to a retardation, disorder or delayed development in one or more of the process of speech, language, reading, spelling, language writing or arithmetic resulting from a possible cerebral dysfunction and emotional or behavioural disturbances and from mental retardation, sensory deprivation or cultural or instructional factors".

The learning disabled student was often been referred to as an individual with an **"invisible handicap".** The learning disabled child usually appears normal in every respect, except for the fact that his/her learning difficulties limit progress in school.

Learning Disabilities (LD) concern a specific group of handicapped children and youth. Education for all Handicapped Children Act defines Learning Disability (LD) as Specific Learning Disabilities (SLD) means a disorder in one or more of the basic psychological processes involved in/or in using language, spoken or written, which, may manifest themselves in an imperfect ability to listen, think, speak, read, write, spell or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, dyslexia and developmental aphasia.

Children with written difficulties show poor and illegible handwriting, giving pressure on the hand while writing, interchanging of capital and small letters, improper spacing of letters and words, mirror writing, reversals, letters are not on the line, and lack of fluency in writing. The term used for these writing disabilities is **Dysgraphia.**

Dysgraphia is a medical term for a brain condition that cause poor handwriting or problems performing the physical aspects of writing (such as an awkward pencil grip or bad handwriting) spelling, or putting thoughts on paper. The disorder causes a person's writing to be distorted or incorrect.

In children, the disorder generally appears when they are first introduced to writing, as they make inappropriately sized and spaced letters, or write wrong or misspelled words. The term may also be used to categorize more general writing problems, although in many cases their issues may be more clearly attributable to a more pervasive learning problem such as Attention Deficit Hyperactive Disorder (ADHD) or specific reading disability. Children with the disorder may have other learning disabilities but they usually have no social or other academic problems.

A problem with Dysgraphia may be suspected if the person has difficulty in putting together a written document (such as using outline), bad or illegible handwriting, awkward or cramped pencil grip, or avoids tasks that involve writing. The person may have problems in fleshing out ideas on paper or writing the minimum (or less) that the assignment requires in contrast to the person's ability to discuss such ideas verbally. There may be an inconsistency in the way letters and words look, or problems with writing within the margins or line spacing and inconsistent spacing between words.

Effort must be given to help the handwriting of students to become as fluent and legible as possible. In order to plan a diagnostic prescriptive, remedial or preventive programme for children with LD the prime necessity is to find out the kinds and types of LD in children that are most commonly expressed by our teachers.

NEED AND SIGNIFICANCE OF THE STUDY

The 86th Amendment in the Constitution declaring elementary education the fundamental right of every child mandates the government to ensure that all children, including children with disabilities has access to education, and needed support must be provided. The SSA aims to provide useful and relevant elementary education to all children including children with disabilities in the age range of 6-14 years by 2010. The person with Disability Act (1995) makes it mandatory on the part of government to provide needed educational facilities for the disabled. SSA programme lays special thrust on making education at the elementary level useful and relevant for children by improving the curricula, child centered activities and effective teaching learning strategies. It ensures that every child with special needs, irrespective of the kind, category and degree of disability, is provided education in an appropriate environment. It adopts **"Zero rejection"** policy so that no child is left out of the education system.

Children with Learning Disability are the children with special need. Once LD is identified, the categories of assistance such as psychosocial, technological and educational are to be provided. In educational programmes, children must be provided optimum educational experiences and remediation to overcome their lacunae. The broader group of students with learning problem can often be handled through consulting teachers, the education of regular teachers or modification of the elementary school curriculum, whereas the specific learning disabled child usually require intensive remedial assistance.

A single model of educational programme for children with learning disabilities is not suitable for all children living in different regions: any model that provides right remediation through right strategies with right material and technology in the right time and in the right place, makes the education of the children with learning disabilities as gainful as that of non-disabled children.

It is said that there are not problem children, but children with problems. Surveys conducted in schools show that 30% of school children are having learning disabilities. Some underachievers have emotional or Behavioural problems and may not be keen to make an effort to get good marks. Some others are unable to achieve good results because of their physical or intellectual handicaps. But majority of children who show scholastic backwardness are actually bright, yet cannot get good marks inspite of efforts due to their inborn LD. Thus each underachiever in School has a different reason for poor school performance and the causes may lie in the child himself or in the environment. Each child with poor school performance has a unique diagnosable entity, hence it is essential to diagnose the specific cause of low achievement in a given child, to enable appropriate intervention.

Many children with LD develop frustration and hopelessness, as they are unable to perform well, in spite of having high intelligence. Hence it is right time that these children be identified at an earlier stage and given proper remediation.

The children with LD are not a problem, but they have a problem. It is not a disease, hence it has no cure, but it is a situation. These children are not disabled but they are differently abled. They have their own style. Hence it is important to hear the word of a child with LD.

"If I cannot learn the way you teach,

Will you teach me the way I can learn?" (LD Child)

These are our nation's children

Our children are born to win

We are their leaders who must lift them up to higher levels

Let us join hands to make this a better world and bright world for our children.

We can't overcome such disabilities but only be minimized at a certain limit. For this, effort such as remediation must be given to child with writing difficulties. .

Remediation/treatment may include therapy/intervention for motor disorders to help control writing movements. Other intervention may address memory or other neurological problems. Many people with Dysgraphia benefit from explicit instructions in the skills required to produce a written work. Checklists that outline all the steps involved in a writing process may help. For example a student could be taught several different ways to create an outline and use a checklist to make sure that all the steps in creating an outline have been used.

Communication through writing is considered to be a complex human task to incorporate cognitive, perceptual and motor aspects. In fact one of the prime tasks expected of a child in school is to write. In the moment that this skill has been acquired, I become a crucial tool in the learning process and in our daily life. Writing serves as means of communication, used inorder to express and report ideas and opinions. In the learning process, writing serves in organizing the learned material and in its memorization. Although, in recent years there is an increase in the use of advanced technological equipments, primarily of word processors, handwriting is still regarded as the most accessible and available means of communication to be used by the majority of the people.

Writing is regarded to be the fourth language skill to develop within a child after three prime developmental prerequisites: understanding, speaking and reading (Ezer, 1991; Sandbeck, Woldan, & Zailer, 1995). A child who is not capable of writing will have difficulty to communicate using this channel, and consequently this may affect his/her school performance along with the negative effect on the child's self esteem (Sassoon, 1990).

The request to write begins at a very early age in school, usually starting at the first day of school, where children are taught to write their names. The basic goals of hand writing instructions are to help students develop writing that is legible and can be produced quickly with little conscious attention. In the early elementary grades, considerable attention is directed at teaching students to form accurately and quickly individual letters. To promote accuracy and fluency in context, students also receive considerable practice copying or composing words, sentences, or longer sections of connected discourse containing the target letters. At this point,

teachers often emphasize the importance of the overall appearance of student's writing, because factors such as neatness can affect other person's judgments concerning the quality of a composition. It is really important to help students, as soon as possible, develop a comfortable and effective pencil grip and posture for writing.

Difficulties with writing often lead to misunderstanding from the part of the teachers, parents and consequently of the students themselves. This is especially true for the bright, linguistically fast students who encounter a major stumbling block when dealing with written expression due to the lack of smooth, efficient automaticity in letter and word formation. These students struggle to translate their thoughts and knowledge, which then denies their teachers the opportunity to understand what they know.

Words are the primary means of communication. It is the way we tells each other what we want and what we don't want, what we think, and how we feel. When words are spoken, they are a wonderful asset-quick, direct, and easy. But when words must be written, they become burdensome- a slow and laborious task. Many students with Learning Disability have significant problems in the acquisition and use of written language, and these problems often continue to adversely affect their lives as adults (Johnson & Blalock, 1987).

The written form of language is the highest and most complex type of communication. In the hierarchy of the development of language skills, it is the last to be learned. Through writing, the learner integrates previous learning and experiences in listening, speaking, and reading. Besides an adequate basis of oral language skills, proficiency in written language requires many other competencies, including the ability to keep one area in mind while formulating it in words and sentences; skill in planning the correct graphic form for each letter and word while manipulating the writing instrument; and sufficient visual and motor memory to integrate complex eye- hand relationships.

The intricacy of the psychomotor process involved in handwriting has long been recognized. Learning to write is not a mechanical, lower-level reflex response, but a thinking process, entailing activity of the cortical nerve areas. Smooth motor

co-ordination of eye and hand, control of arm, hand, and finger muscles are acquired in the process of learning to write. Learning to write also requires maturity adequate for accurate perception of the symbol patterns. Writing from memory demands the retention of visual and kinaesthetic images of forms, not present to the senses, for future recall…… The capacity for graphic representation depends on the motor function of the hand and its coordination with eye movements (Hildreth, 1947).

Writing is required in all subjects of curriculum, not only when written language is the focus of instruction. The instructional concept of "writing across the curriculum' has become a persuasive force in the teaching of writing. Multimedia will change the way of communication in the virtual and real class rooms. The speed at which technology is altering classroom communication is overwhelming.

Now a days some teachers may allow students with a disorder in written expression to use other methods, such as an oral report, to access their understanding of a subject instead of asking them to write a paper or take a written test. Computers can help many students with Dysgraphia, to Spell check, grammar check, and other computer programmes may help individuals with Dysgraphia.

Multimedia programmes help to improve students' learning skills in an interactive media based environment. These are typically categorized as visual, auditory and kinaesthetic. Traditional classroom settings primarily facilitate the visual learner. The strength of multimedia is that it stimulates all learning modalities simultaneously to integrate and organize vast quantities of auditory and visual data. This happens in a gradual sequential and progressive manner. Readings makes high demands on personal time, ready or not, the e-age is upon us. The focus on technology is a driving force in education in the new millennium.

Children must master visual skills before they can even begin to develop verbal skills. Visual skills are a necessary foundation for later speech and reading skills. Teaching visual literacy helps children with learning difficulty better interpret art and visual media that they come in contact with visual literacy allows a deeper interaction with focus of all kinds, introduces the process of analytical thinking about representation and memory.

Integrating visual and auditory instruction in the classroom curriculum begins by asking a few key questions to spark the critical thinking process. Visual communicators evaluate visual images by asking: what am I looking at? What does this image mean to me? What is the relationship between the image and displayed text message? How is this message effective? What are some visual / verbal relationships I can use? Once students internalize these questions, not only will students be prepared to recognize and decode subversive advertising messages, but they will also be prepared to communicate with a level of visual sophistication that will carry them through the multimedia dependent environment of education. Multimedia instruction will better prepare students with reading/ writing difficulty for the dynamic and constantly changing online world they will inevitably be communicating through.

Individuals can integrate information from different sensory modalities into one meaningful experience-such as when they associate the sound of thunder with the visual image of lightning in the sky. They can also integrate information from verbal and non-verbal information into a mental model-such as when they watch lightning in the sky and listen to an explanation of the event. Therefore, the instructional designer is faced with the need to choose between several combinations of modes and modalities to promote meaningful learning. The role of multimedia based instructional design takes on responsibility and therefore becomes a critical component of the integrative process of education as multimedia based instructional design is operated in this study as a process that applies technology-based learning of all kinds that is accessible to students with writing difficulty and help them learn independently.

Through multimedia based instruction, students with learning difficulty can understand the fundamental concepts more effectively. The recent advancement in teaching and learning principles have to be adopted by instructors / care givers in order to bring out better results of teaching and learning. Multimedia is a very effective means of presentation. The use of audio causes retention rate of about 20 % in students and audio-visual causes 30 % retention and use of multimedia presentations causes the retention rate is as high as 60 %, if the students are highly involved in it. At present the role of teachers in educating the students with learning

difficulties has gained a paramount importance. The classes should be motivating by the use of multimedia packages in classrooms and this will also enhances learning in a fast rate. To develop the interest in learning, for meaningful developments in study habits and for the better adaptation of self confidence in students, the usage of multimedia along with classroom intervention is essential. Now a days classes need multimedia packages and students' knowledge and capacity will improve if the students are involved in this circle. The multimedia instructional design based learning package which is in Compact Disk form can meet the learning requirements for students to minimize Dysgraphia in the learner centered learning environment. The practice of tracking by grouping students of similar achievement for instruction ,and classroom instruction will more appropriately tailored to students' needs will experience more rapid achievement growth in both high and low-track students. It is in this context the present study focused to develop a remedial tracking package based on multimedia instructional design for students with Dysgraphia.

STATEMENT OF THE PROBLEM

Dysgraphia is a difficulty in automatically remembering and mastering the sequence of muscle motor movements needed in writing letters or numbers. This difficulty is out of harmony with the person's intelligence, regular teaching instruction and the use of the pencil in non-learning tasks. It is neurologically based and exists in varying degrees, ranging from mild to moderate. It can be diagnosed and minimized if appropriate remedial strategies are provided conscientiously. An adequate remedial programme generally works if applied on a daily basis.

The literature offers a number of techniques to assist pupil coping with writing difficulties. Writing is translating of thoughts on to paper. It is a very important skill, particularly during the school years. Schools lay much emphasis on written communication. This study attempts to focus on remedial programmes based on learning styles that can be given to Dysgraphyia. Hence the problem under investigation is entitled as **DEVELOPING A MULTIMEDIA REMEDIAL TRACKING PACKAGE FOR DYSGRAPHIA AMONG PRIMARY SCHOOL STUDENTS WITH SPECIFIC LEARNING DISABILITIES.**

DEFINITION OF KEY TERMS

Learning Disability: It is a general term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities or of social skills (NJCLD, 1988).

Specific Learning Disabilities: It means a disorder in one or more of the basic psychological process involved in understanding or in using language spoken or written, which may manifest themselves in an imperfect ability to listen, think, read, write, spell or to do mathematical calculations. It includes conditions as Dyslexia and Dysgraphia (Hallahan & Hauffman, 1978).

The term means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia (IDEA, 2004).

Dysgraphia: It is a retarded development or an acquired loss in the skill of writing. It is a difficulty in automatically remembering and mastering the sequence of muscle motor movements needed in writing letters or numbers (Kirk, 1962).

In the context of the present study, Investigator specifically focuses on the definition of Dysgraphia as a severe difficulty in producing handwriting that is legible and written at an age appropriate speed. Disorder in writing which makes distorted or incorrect, inappropriately sized and spaced letters or wrong or misspelled words, despite thorough instruction (NINDS, 2006).

Multimedia: A computer system providing video and audio material as well as text (Soanes, 2007).

OPERATIONAL DEFINITIONS

Multimedia: It means the computer information represented through audio, video, animation in addition to traditional media i.e., text, graphics, drawing, and images.

In the context of the present study, Multimedia is the field concerned with the computer controlled integration of text, graphics, drawings, still and moving images (video), animation, audio and any other media where every type of information can be represented , stored, transmitted and processed digitally.

Tracking: It refers to the practice of grouping students according to achievement levels, either between or within classrooms, for the purpose of instruction.

In the context of the present study, the term tracking is used. The term ability grouping is frequently used in place of tracking, especially when discussing within-class tracking in elementary schools and British researchers often use the term streaming in place of tracking.

Remedial Tracking Package: It is a specially designed phase-by-phase training programme and instruction with special materials, learning techniques, equipments and activities which meet the unusual needs of a student with Specific Learning Disabilities to track, correct and minimize writing difficulties in learner's accomplishments or achievements with the expectations that the learner will ultimately master the regular curriculum through regular channels.

Multimedia Remedial Tracking Package: It is a specially designed computer software providing video and audio material as well as text containing phase-by-phase training programmes, interventions, and instructions with special materials, learning techniques, equipments and activities which meet the unusual needs of a student with Specific Learning Disabilities to track, correct and minimize writing difficulties in learner's accomplishments or achievements with the expectations that the learner will ultimately master the regular curriculum through regular channels.

OBJECTIVES OF THE STUDY

1. To identify students belonging to Scholastic Backward (SB) among Primary School Students (PSS) studying in State / CBSE schemes.

2. To identify PSS with Learning Disability (LD) from the students belongs to SB.

3. To assess Reading level and Intelligence level of PSS with LD.

4. To develop Dysgraphia Characteristics Inventory (DCI).

5. To develop Learning Style Inventory (LSI).

6. To develop and implement Multimedia Remedial Tracking Package (MRTP) among PSS with SLD.

7. To prepare and standardize Pretest-Posttest based on different aspects of Dysgraphia.

8. To find out the effectiveness of Multimedia Remedial Tracking Package (MRTP) for Dysgraphia among Primary School Students (PSS) with Specific Learning Disabilities (SLD).

   A (i). To find out the effectiveness of MRTP by comparing the Learning Disability (LD) level at initial, middle, and final implementation phases of MRTP among PSS with SLD totally and dimension-wise.

   (ii). To find out the significant difference if any in the level of LD at the initial , middle, and final stages of MRTP among PSS with SLD totally and dimension wise on subsamples

   a. Boys / Girls

   b. State / CBSE Schemes

   B. To find out the effectiveness of MRTP by measuring the level of Dysgraphia of PSS with SLD at the initial and final stages of Integrated phase totally and in terms of different aspects of Dysgraphia characteristics.

C. To find out the effectiveness of MRTP by comparing the performance of PSS with SLD at initial and final stages of integrated phase totally, in terms of different aspects of Dysgraphia , and learning style-wise.

9. To find out the significant difference if any in the level of Dysgraphia among PSS with SLD at the initial and final stages of integrated phases of MRTP totally and in terms of different aspects of Dysgraphia characteristics on subsamples

   a. Boys / Girls

   b. State / CBSE Schemes

10. To find out the significant difference if any in the performance of PSS with SLD at the initial and final stages of integrated phase of MRTP totally, and in terms of different aspects of Dysgraphia on subsamples

   a. Boys / Girls

   b. State / CBSE Schemes

   c. Visual / Auditory / Kinaesthetic Learning Styles

HYPOTHESES OF THE STUDY

1. Multimedia Remedial Tracking Package (MRTP) is highly effective in minimizing Dysgraphia among Primary School Students (PSS) with Specific Learning Disabilities (SLD).

2. There will be significant difference in Dysgraphia among Primary School Students (PSS) with SLD before and after the intervention of MRTP on subsamples

   a. Boys / Girls

   b. State / CBSE Schemes

   c. Visual/ Auditory / Kinaesthetic Learning Styles

METHODOLOGY IN BRIEF

The Investigator intends to identify the disabilities of students, develop and implement the remedial package, and measure the effectiveness of the package among Primary School students with SLD.

For the present study, the Investigator selected Survey cum experimental method to collect data from Primary School Students belonging to different scheme of study (State/ CBSE) where both Learning disabled and non-disabled children were studying together.

One group Pre-test Post-test Design was selected for the study. The Investigator at first identified the Primary School Students with Scholastic Backwardness (SB) and from these, students with Learning Disability were selected and subjected for Diagnostic test of Learning Disability and Intelligence test. Then the Reading Level, Learning styles and Level of Dysgraphia Characteristics among these students were found out. Then developed a Multimedia Remedial Tracking Package and administered among these students so as to find out the effectiveness of the same.

The sample comprising 39 students aged 8-10 years with Specific Learning Disabilities (SLD) from CBSE and State syllabus followed Primary Schools of Selected Districts of Kerala and the districts were selected through purposive sampling technique. In this study investigator adopted sampling procedure to select subjects in view of the specific nature of the study and limited number of students with SLD available in Primary Schools.

TOOLS AND MATERIALS USED IN THE STUDY

The following tools were used for the present study.

1. Proforma of Scholastic Backwardness (PSB)
2. Raven's Coloured Progressive Matrices (CPM)
3. Diagnostic Test of Learning Disability (DTLD)
4. Ekwall Informal Reading Inventory (ERI)

5. Dysgraphia Characteristics Inventory (DCI)
6. Learning Style Inventory (LSI)
7. Dysgraphia Performance Test (DPT)
8. Multimedia Remedial Tracking Package (MRTP)

STATISTICAL TECHNIQUES EMPLOYED

The data processing is done by using statistical techniques such as descriptive statistics, Paired 't' test, **One-way repeated-measures ANOVA** (Greenhouse – Geisser corrected values) and **Post hoc** test (pair wise multiple comparison with Bonferroni correction) were used.

CONCLUSIONS BASED ON FINDINGS

I. MRTP is effective in significantly minimizing the Learning Disability among PSS with SLD with respect to the overall aspects

This conclusion is substantiated by the following findings.

The results of the means of performance of PSS with SLD at initial, middle, and final stages of MRTP on **overall aspects of LD** of total are (33.4,44.4,50.8), boys (33.1,44.8,51.6), girls (33.6,43.9,49.90, State scheme are (35.0,47.0,53.4), and CBSE scheme are (31.8,41.9,48.5) respectively.

The **F** values (one-way repeated-measures ANOVA-Greenhouse –Geisser corrected values) of total, boys, girls, State, and CBSE scheme are 502.91, 299.18, 216.08, 300.09, and 221.78 respectively are significant at **0.01** level.

The pair-wise comparison with **Bonferroni correction (Post hoc test)** shows that the mean difference between the initial-middle (based on learning style) , initial – final (MRTP as whole) and middle –final (integrated phase) stages of implementation of MRTP of total sample are (11.0,17.5,6.5), boys are (11.6,18.5,6.9), girls are (10.3,16.3,6.0), State scheme are (12.0,18.4,6.4), and CBSE scheme are (10.1,16.7,6.6) significant at **0.05** level.

It is found that an increase in performance in over all aspects of LD from the initial stage to middle stages, from middle to final stage of implementation of MRTP and overall increase are significant.

II. MRTP is effective in significantly minimizing Dysgraphia characteristics in its various aspects except 'Reading and Retelling a Story' among the PSS with SLD for total sample.

This conclusion is substantiated by the following findings.

The obtained paired 't' value of pre and post assessments regarding various aspects of Dysgraphia Characteristics among PSS with SLD for total sample were given below.

Difficulty with Alphabet symbols	M1=4.0	M2=2.9	t=10.15	P<0.01
Confusion with directionality	M1=3.9	M2=2.8	t=11.92	P<0.01
Tendency to perseverates	M1=3.8	M2=2.9	t =8.24	P<0.01
Sentence structure	M1=4.1	M2=3.0	t =11.6	P<0.01
Difficulty in copying shapes	M1=3.9	M2=2.9	t =10.2	P<0.01
Tendency to telescope	M1=3.6	M2=2.4	t= 9.4	P<0.01
Identification of alphabets	M1=2.6	M2=4.0	t=10.47	P<0.01
Identification of words with/without blends	M1=2.5	M2=3.5	t=6.03	P<0.01
Identification or words with diphthongs & Blends	M1=3.1	M2=4.0	t=6.27	P<0.01
Identification of digraphs and consonants	M1=3.1	M2=2.3	t =8.96	P<0.01
Sentence with more than three words	M1=2.8	M2=3.9	t =7.64	P<0.01
Reading and retelling a story	M1=3.0	M2=3.2	t =1.82	P>0.01
Reading a content	M1=3.5	M2=2.4	t =6.75	P<0.01
Underachievement	M1=4.0	M2=3.0	t =6.95	P<0.01
Memory difficulties	M1=4.2	M2=3.2	t = 7.18	P<0.01
Speech, Phonological and Language difficulty	M1=3.5	M2=2.4	t = 7.88	P<0.01

Speech and Written Language difficulty	M1=4.2	M2=3.0	t = 0.28	P<0.01
Visual Motor difficulties	M1=4.1	M2=2.4	t = 2.16	P<0.01
Lack of Concentration	M1=3.1	M2=2.3	t = 6.47	P<0.01
Social Interaction	M1=3.1	M2=2.3	t = 6.49	P<0.01

It is found that the MRTP is effective in minimizing Dysgraphia among PSS with SLD.

III(i) **MRTP is effective in significantly minimizing Dysgraphia in overall aspects.**

This conclusion is substantiated by the following findings.

The paired ' t' values obtained between the pre-test and post-test based on **overall** aspects of total sample, sub samples-Gender (Boys / Girls), Scheme of study (State/CBSE), and learning styles (Visual, Auditory, Kinaesthetic) were given below.

Total	M1=35.2	M2=63.0	t=26.44	P<0.01
Boys	M1=34.9	M2=64.8	t=19.68	P<0.01
Girls	M1=35.6	M2=60.9	t=20.67	P<0.01
State	M1=36.7	M2=63.4	t=24.19	P<0.01
CBSE	M1=33.8	M2=62.6	t=16.38	P<0.01
Auditory	M1=37.0	M2=62.7	t=9.59	P<0.01
Visual	M1=36.1	M2=62.8	t=20.12	P<0.01
Auditory + Visual + Kinaesthetic	M1=32.5	M2=63.4	t=17.74	P<0.01

It is found that the MRTP is effective in minimizing Dysgraphia in its over all aspects.

(ii) **MRTP is effective in significantly minimizing Dysgraphia among PSS with SLD with respect to aspect 'Eye Motor Co-ordination' (EMC).**

This conclusion is substantiated by the following findings.

The paired 't' values obtained between the pre-test and post- test based on '**Eye-**

Motor Co-ordination' of total sample, sub samples-gender (Boys/Girls), scheme of study (State/CBSE), and learning styles (Visual/Auditory/Kinaesthetic) were given below.

Total	M1=10.1	M2=16.6	t=11.98	P<0.01
Boys	M1=10.3	M2=17.0	t=7.73	P<0.01
Girls	M1=9.9	M2=16.1	t=10.17	P<0.01
State	M1=11.2	M2=16.6	t=7.75	P<0.01
CBSE	M1=9.2	M2=16.5	t = 9.6	P<0.01
Auditory	M1=10.9	M2=17.1	t =3.98	P<0.01
Visual	M1=10.4	M2=16.5	t=7.68	P<0.01
Auditory + Visual + Kinaesthetic	M1=9.2	M2=16.3	t= 11.4	P<0.01

It is found that the MRTP is effective in minimizing Dysgraphia in its' Eye Hand Co-ordination' aspect.

(iii) **MRTP is effective in significantly minimizing Dysgrahia among PSS with SLD with respect to aspect 'Figure Constancy' (FC).**

This conclusion is substantiated by the following findings.

The paired 't' values obtained between the pretest and post test based on '**Figure Constancy'** of total sample, subsamples -Gender (Boys/Girls), scheme of study (State/CBSE), and learning styles (Visual/Auditory/Kinaesthetic) were given below.

Total	M1=4.7	M2=8.6	t=14.19	P<0.01
Boys	M1=4.8	M2=8.7	t =9.03	P<0.01
Girls	M1=4.6	M2=8.4	t = 11.7	P<0.01
State	M1=5.0	M2=8.7	t = 0.97	P<0.01
CBSE	M1=4.4	M2=8.4	t = 9.32	P<0.01
Auditory	M1=4.9	M2=8.3	t=6.5	P<0.01

Visual	M1=4.8	M2=8.8	t=11.06	P<0.01
Auditory + Visual + Kinaesthetic	M1=4.3	M2=8.4	t = 6.71	P<0.01

It is found that the MRTP is effective in minimizing Dysgraphia in its Figure Constancy aspect.

(iv) **MRTP is effective in minimizing Dysgraphia among PSS with SLD with respect to aspect 'Figure Ground Discrimination' (FGD).**

This conclusion is substantiated by the following findings.

The paired 't' values obtained between the pre-test and post-test based on '**Figure Ground Discrimination'** of total sample, sub samples-Gender (Boys/Girls), scheme of study (State/CBSE), and learning styles (Visual, Auditory, Kinaesthetic) were given below.

Total	M1=5.5	M2=9.8	t =10.94	P<0.01
Boy	M1=5.7	M2=9.8	t = 6.74	P<0.01
Girl	M1=5.3	M2=9.8	t = 9.36	P<0.01
State	M1=5.5	M2=9.6	t = 6.24	P<0.01
CBSE	M1=5.5	M2=10.1	t = 9.74	P<0.01
Auditory	M1=5.8	M2=10.6	t = 5.76	P,0.01
Visual	M1=5.7	M2=9.8	t = 9.94	P,0.01
Auditory + Visual + Kinaesthetic	M1=4.9	M2=9.3	t = 4.47	P<0.01

It is found that the MRTP is effective in minimizing Dysgraphia in its Figure Ground Discrimination aspect.

(v) MRTP is not effective in significantly minimizing Dysgraphia among PSS with SLD with respect to aspect 'Position in Space'.

This conclusion is substantiated by the following findings.

The paired 't' values obtained between the pre-test and post-test based on '**Position in space'** of total sample, sub samples-Gender (Boys/Girls), scheme of study

(State/CBSE), and learning styles (Visual, Auditory, Kinaesthetic) were given below.

Total	M1=6.4	M2=6.9	t=1.46	P<0.01
Boys	M1=6.5	M2=7.1	t=1.13	P,0.01
Girls	M1=6.3	M2=6.6	t=1.05	P<0.01
State	M1=6.3	M2=6.9	t=1.64	P<0.01
CBSE	M1=6.6	M2=6.9	t=0.6	P<0.01
Auditory	M1=6.7	M2=6.8	t=0.12	P<0.01
Visual	M1=6.4	M2=6.8	t=1.03	P<0.01
Auditory + Visual + Kinaesthetic	M1=6.3	M2=7.0	t=1.62	P<0.01

It is found that the MRTP is not much effective for minimizing 'Position in Space' aspect of Dysgraphia.

(vi) **MRTP is effective in significantly minimizing Dysgraphia among PSS with SLD with respect to aspect' Spatial Relations '(SR) .**

This conclusion is substantiated by the following findings.

The paired 't' values obtained between the pre-test and post-test based on '**Spatial Relations'** aspect of total sample, sub samples-Gender (Boys/Girls), scheme of study (State/CBSE), and learning styles (Visual, Auditory, Kinaesthetic) were given below.

Total	M1=3.2	M2=6.9	t=17.29	P<0.01
Boys	M1=3.1	M2=7.1	t = 13.3	P<0.01
Girls	M1=3.3	M2=6.6	t =11.8	P<0.01
State	M1=3.3	M2=6.9	t=14.57	P<0.01
CBSE	M1=3.1	M2=6.9	t=10.81	P<0.01
Auditory	M1=3.3	M2=6.8	t=5.5	P<0.01
Visual	M1=3.2	M2=6.8	t=14.03	P<0.01

Auditory + Visual + Kinaesthetic	M1=3.1	M2=7.0	t=10.94	P<0.01

It is found that the MRTP is effective in minimizing Dysgraphia in its Spatial Relation aspect.

(vii) MRTP is effective in significantly minimizing Dysgraphia among PSS with SLD with respect to aspect 'Auditory Perception' (AP).

This conclusion is substantiated by the following findings.

The paired 't' values obtained between the pre-test and post-test based '**Auditory Perception'** aspect of total sample, sub sample-Gender (Boys/Girls), scheme of study (State/CBSE), and learning styles (Visual, Auditory, Kinaesthetic) were given below.

Total	M1=5.6	M2=9.1	t=10.81	P<0.01
Boys	M1=5.2	M2=9.6	t=10.42	P<0.01
Girls	M1=6.1	M2=8.4	t=6.8	P<0.01
State	M1=6.2	M2=9.2	t=8.18	P<0.01
CBSE	M1=5.1	M2=8.9	t=7.59	P<0.01
Auditory	M1=5.7	M2=8.8	t=3.86	P<0.01
Visual	M1=5.7	M2=8.9	t=7.98	P<0.01
Auditory + Visual + Kinaesthetic	M1=5.6	M2=9.4	t=6.52	P<0.0

It is found that the MRTP is effective in minimizing Dysgraphia in its Auditory Perception aspect.